Ames Laboratory Lessons Learned

University of Hawaii Laboratory Explosion Results in Arm Amputation

April, 2016

Category – RED

There has been another tragic accident involving a scientist in an academic research laboratory. Thea Ekins-Coward, post-doctoral researcher, lost her arm in an explosion at the University of Hawaii on March 16th. Dr. Ekins-Coward was working with a mixture of 70% hydrogen, 25% oxygen, and 5% carbon dioxide in a 13 gallon air compressor tank fitted with a digital pressure gauge. The tank exploded when she pressed the off button on the gauge. The preliminary accident report, issued April 19th by the Honolulu Fire Department, points to the improper use of a non-intrinsically safe pressure gauge with flammable gases as the probable cause. The explosion that took Dr. Ekins-Coward's arm was probably caused by equipment not designed for this particular activity. Other contributing factors include modifying and scaling up the established research protocol, ignoring near-miss events such as an explosion the previous week in a smaller vessel, the presence of static discharges, and the dismissal by Dr. Ekins-Coward's Group Leader of her concerns regarding the static electricity. The report provides several lessons directly related to the safety initiatives currently underway at Ames Laboratory.

Director Schwartz and Deputy Director Lograsso have been meeting with groups to discuss safety culture and the safe conduct of research at the Laboratory. The following lessons can be applied:

- **What is the Worst Thing That Could Happen?** In the Hawaii incident, it doesn't appear the group considered the explosive capabilities of the mixture they were placing in the tank. Prior to this CHANGE the gases were plumbed directly to the reaction vessel and were not pre-mixed.
- **Have I Done Everything to be Safe?** The researchers used equipment designed for compressed air, not flammable gases; they didn't take into account the need for intrinsically safe electrical components; and they didn't ground the tank to prevent static discharge.
- **Small Changes Can Have Large Consequences!** The research group moved from a proven method of segregated gas delivery to mixing gases in a non-approved pressure vessel. During scale-up, an internal explosion occurred in a one-gallon air tank, with no injuries or impacts. The near-miss was ignored and the group transitioned to the 13 gallon tank, which exploded violently the first time it was used.
- **Have a Questioning Attitude.** Dr. Ekins-Coward questioned the presence of static discharge, but not the change in research procedure or the equipment used. It is unclear if the equipment design was ever reviewed by other personnel with expertise in flammable gas handling or pressure systems. **REMEMBER – You can always STOP work until your questions are answered!**

"As scientists, we advance the human understanding of the world and develop the building blocks for current and future research. It is unacceptable that researchers are being injured or killed in the process. We collaborate daily to advance science, so why not collaborate to advance safety? We need to apply cooperative principles not just to research, but to how we conduct research. I expect the Laboratory to be a leader in all aspects of research, including ensuring a safe and healthy work environment."

- *Adam Schwartz, Director*

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Images: Honolulu Star Advertiser and Honolulu Fire Department